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ART. XIII.—*Remarks on the Origin of the Popular Belief in the Upas, or Poison Tree of Java*, by LIEUT. COL. W. H. SYKES, F.R.S.

Read March 4th, 1837.

THERE are very few popular beliefs of any duration, however extravagant or incredible, that cannot be traced to some foundation in truth, however much distorted by ignorance, superstition or folly; and we have a remarkable instance of this in the celebrated Upas, or Poison Tree of Java, whose shade was believed to extinguish life in the unhappy beings who sought refuge under it. It was stated to be in a valley in the interior of Java, but it was surrounded with so many terrors, that its exact locality was not likely to be well defined or understood; and in this uncertainty originated the fables which have so long been before the public. I am indebted to Sir Charles Forbes, for a copy of a letter addressed to the late W. Taylor Money, Esq., Consul-General at Venice, from a gentleman who visited the Guwo-Upas, or Poisoned Valley, near Batur, in Java, on the 4th of July, 1830. I understand that the letter has appeared in print, but I have not seen it; and I deem it necessary to incorporate it in the present paper, to facilitate the comparisons and deductions I purpose making. A perusal of it will, I presume, afford satisfactory reasons to conclude, that in this deadly spot originated the belief in the Poison Tree, the mistake of the mephitic vapour escaping from vegetation, rather than from the soil, being natural and probable. The writer of the letter is a gentleman of the name of Loudon, an Englishman, but a landholder in Java, well known to Doctor Horsfield, and full reliance may be placed on the accuracy of his descriptions. He is disposed to question the resemblance between this Valley of Death and the Grotto del Cane, near to Naples; but I will endeavour to show that the difference is only in the physical features of the localities, and that the probability is, that the effects described originate in precisely similar causes. Dr. Horsfield informs me that he was at Batur in 1815 and 1816, and aware of the vicinity of the poisonous valley, but the natives refused to conduct him to it.

The following is Mr. Loudon's letter:—

“ In July last (1830), when returning from a visit to the interior of Java, I examined, in company with several others, the *Guwo-Upas*, or *Poisoned Valley*, perhaps the most extraordinary place in the world, and as a description of it may not be uninteresting at your fire-side, the following is the copy of a letter which I have this day written to Dr. Horsfield, the botanist, who was many years in Java.

“ ‘In the publications of the Batavia Society of Arts and Sciences, I have sometimes read with pleasure your travels and experiments, and particularly that of the *Pohu-Upas*, at Banjowangie (where I was resident in 1811), as well as your *Tour*, published by the same Society in the 8th Vol. of their transactions, and while at *Batur* you state (p. 24), ‘The *Guwor-Upas* is dreaded by the natives, and according to their account, resembles the *Grotto-del-Cane* near Naples. They could not be prevailed on to conduct me to this opening.’

“ ‘The object of this letter is to acquaint you that on the 4th of July last, I visited the valley in question, on my return from a tour through the districts of Bagalun, Banjonvas, and Ledok; and I should be happy to have an opinion upon such a phenomenon of nature; and as you have examined the mineralogical constitution of these ranges of mountains, I know no person so capable of giving an opinion on the Valley of Death as yourself. The following is an extract from my Journal on the subject.

“ ‘*Batur*, 3rd July, 1830.—This morning, while walking about the village with the Patty (native chief), he told me that there is a valley, only three miles from Batur, that no person could approach without forfeiting their lives; and that the skeletons of human beings, and all sorts of beasts and birds, covered the bottom of the valley. I mentioned this to the Commandant, and Mr. Sprenden-berg, and proposed going to see it; and the Assistant Resident, Mr. Darndels, agreed to go with us early next morning. At this time I did not credit all the Javanese chief told me; I knew that there was a lake on the top of one of the hills that it was dangerous to approach too near; but I had never heard of this Valley of Death.—Very cold this evening, the therm. 52°.

“ ‘*Batur*, 4th July.—Early this morning we made an excursion to the extraordinary valley, called by the natives *Guwo-Upas*, or *Poisoned Valley*; it is three miles from Batur, on the road to the Djung. Mr. Darndels had ordered a foot-path to be made from the main road to the valley; we took with us two dogs and some fowls, to try experiments in this deadly recess. On arriving at the foot of a mountain we dismounted, and scrambled up the side of a hill, fully a quarter of a mile, holding on by the extended roots and branches of trees, and we were a good deal fatigued before we got up, the path being very steep, and slippery from the heavy rains during the night. When within a few yards of the valley, we experienced a strong, nauseous, sickening, and suffocating smell; but on coming close to the edge, this smell left us. We were now lost in astonishment at the awful scene below us. The valley appeared to be

about half a mile in circumference, oval; the depth from thirty to thirty-five feet, the bottom quite flat, no vegetation, a few large (in appearance) river stones, and the whole covered with the skeletons of human beings, tigers, pigs, deer, peacocks, and all sorts of beasts and birds; we could not perceive any vapour, or opening in the ground, which last appeared to be of a hard sandy substance. The sides of the valley, from the top to the bottom, are covered with vegetation, trees, shrubs, &c. It was now proposed by one of the party to enter the valley; but at the spot where we were, this was difficult, at least to me, as a false step would have brought us to eternity, and no assistance could be given. We now lighted our cigars, and with the assistance of a bamboo we went down within eighteen feet of the bottom; here we did not experience any difficulty in breathing, but a sickening nauseous smell. We now fastened a dog to the end of a bamboo eighteen feet long, and sent him in; we had our watches in our hands, and in fourteen seconds he fell on his back; he did not move his limbs or look round, but continued to breathe eighteen minutes; we then sent in another, or rather he got loose from the bamboo, but walked in to where the other dog was lying; he then stood quite still, and in ten seconds fell on his face, and never moved his limbs afterwards, but continued to breathe for seven minutes. We then tried a fowl, which died in a minute and a half; we threw in another, which died before touching the ground: during these experiments we experienced a heavy shower of rain, but we were so interested by the awful scene before us, that we did not care for getting wet. On the opposite side of the valley is a large stone, near which is the skeleton of a human being, who must have perished on his back with his right arm under his head: from being exposed to the weather, the bones were bleached, and as white as ivory. I was anxious to get this skeleton, but any attempt to get at it would have been madness. After remaining two hours in this Valley of Death, we returned; but found some difficulty in getting out; from the late heavy shower the sides of the valley had become very slippery, and had it not been for two Javanese behind me, I certainly must have fallen some distance below; being rather heavy, I held on by the branch of a tree; when my foot slipped, the branch gave way. On reaching our rendezvous, we had some brandy and water, and left this extraordinary valley. Came down the slippery foot-path, sometimes on our hams and hands, to the main road, mounted our horses and returned to Batur, quite pleased with our interesting trip. The human skeletons are supposed to have been rebels, who may have been pursued from the

main road, and taken refuge in the different valleys, and a wanderer cannot know his danger, till he is in the valley, and when once there, he has not the power or presence of mind to return.'

"You will perceive, from the above extract, that there is a great difference between this and the *Grotto del Cane*, near Naples, where the air is confined to a small aperture, while here the circumference is fully half a mile.

"After I have seen my family at the Hague, I shall go to London, and will do myself the pleasure of calling upon you; in the mean time, I should be happy to have your opinion of the mineral constitution of the hills near this extraordinary valley, where there is not the least smell of sulphur, nor any appearance of an eruption ever having taken place near it, although I am aware that the whole range is volcanic, as there are two craters at no great distance from the side of the road, at the foot of the Djring, and they constantly emit smoke."

Such is Mr. Loudon's description, and without having visited the spot myself, from the simple perusal of the letter, I would not hesitate to say that the Poisoned Valley is a volcanic crater, in which the igneous action is latent; and the noxious vapour is carbonic acid gas, produced in a manner made perfectly intelligible, by extracts which I shall give from the Abbate Domenico Romanelli's "*Viaggio a Pompei*," &c. Mr. Loudon speaks of the absence of any smell of sulphur, and the want of any appearance of an eruption having taken place; but that there are craters at no great distance. This is precisely the case at the *Grotta del Cane*; but Mr. Loudon by his description gives a lively idea of his having ascended a volcanic cone, and finding a crater at the top; a precipitous ascent for more than a quarter of a mile (about 500 yards), terminated by an oval valley, with a diameter of about 300 yards, surrounded by a precipitous ledge, not more than thirty-five feet deep. Many such craters may be seen in Italy, and elsewhere. It will not be any objection to this valley being a crater, that the ground appeared to be of a hard sandy substance; for myself and several friends walked at the bottom of the crater of Vesuvius, within a month previous to the eruption of 1822. The effects of the experiments tried by Mr. Loudon with the dogs, are exactly such as are produced at the *Grotta del Cane*; but from the length of time the dogs continued to breathe; one eighteen minutes, and the other seven minutes, (after walking to where his companion lay), I should doubt whether the noxious gas is in so concentrated a state in the Guwo Upas Valley, as in the *Grotta del Cane*, particularly as the scarp of the valley is lined with vegetation close

down to the bottom ; for though carbonic acid gas is necessary to vegetation, yet in an undue proportion, it is as injurious to vegetable as to animal life. The first dog put in was fourteen seconds before he fell senseless ; but at the Grotta del Cane, Doctor Pasquale Panvini, who tried the gas upon himself, was obliged to desist in *ten* seconds, from approaching suffocation. It appears that Mr. Loudon and his friends remained two hours in this valley of death without detriment, and within eighteen feet of the stratum of carbonic acid gas, which, from its great weight, compared with atmospheric air, the former being 1,526 to 1, was lying upon the bottom of the valley. Judging from the depth of the stratum in the Grotta del Cane, which according to Abbate Romanelli, does not exceed a palm,¹ (palmo, a span,) I should have inferred that they might have approached very much nearer, and safely satisfied themselves whether the gas were carbonic acid, by well-known tests ; acidulating a tumbler of water, and trying its effects upon litmus-paper, syrup of violets, lime-water, extinguishing a light, &c.

Dr. Mead, who describes the Grotta del Cane, does not mention the exact height of the gas ; but says, " It has this remarkable difference from common vapours, that it does not, like smoke, disperse itself into the air, but quickly after its rise, falls back again and returns to the earth ; the colour of the sides of the grotto being the measure of its ascent : for so far the sides are of a darkish-green, but higher, common earth. And as I myself found no inconvenience by standing in it (the grotto), so no animal, if its head be *above this mark*, is the least injured ; but when, as the manner is, a dog, or any other creature, is forcibly kept below it, or by reason of its smallness, cannot hold its head above it ; it *presently* loses all motion, falls down as dead or in a swoon, the limbs convulsed and trembling, till at last no more signs of life appear, than a very weak and almost imperceptible beating of the heart and arteries ; which, if the animal be left a *little* longer, *quickly* ceases too ; and then the case is irrecoverable : but if snatched out and laid in the open air, it soon comes to life again, and sooner if thrown into the adjacent lake."²

The newspapers of the last fortnight have given two melancholy instances of the death of several persons from carbonic acid gas, resulting from burning wood or coals in close rooms ; and in the case of three of the parties, it is supposed, had they not slept on

¹ " Che il suolo di questa grotta tramanda continuamente una gran quantità di gas acido carbonico, la cui altezza appena arriva ad un palmo."—Ab. Romanelli, parte seconda, p. 98.

² *Rees's Cyclopædia*, article, GROTTA DEL CANE.

the floor, their lives would not have been endangered ; as the pan of coals had been removed before they went to sleep, and had not been very long in their cell in the prison in which they were confined.

With the Abbate Romanelli's book in my hand I have visited the Grotta del Cane, and witnessed the effects upon dogs described by Dr. Mead, corresponding in fact to the effects detailed by Mr. Loudon, in the Poisoned Valley ; and I will now proceed to the explanation of the phenomena, given by Dr. Pasquale Panvini, an able chemist, and friend of the Abbate D. Romanelli. He considers that sulphur, a volcanic product, being in constant contact with water, a decomposition of the latter takes place, and the result is sulphuric acid, which acting upon carbonate of lime, by its greater affinity for lime than carbonic acid, drives off the latter in the gaseous form, and it rises through the Grotta del Cane. All that is wanted is sulphur, water, and carbonate of lime, under certain combinations, and all these requisites are plentiful in the neighbourhood of the Grotta del Cane. Why the gas should make its escape through one aperture only, in a surface riddled by volcanic action, is not quite so explicable ; but that it has continued in the same state for seventeen or eighteen hundred years, is attested by the Abbate Romanelli's quotation from Pliny, "*Scrobs Charonea mortiferum spiritum exhalans.*"¹

The following is the Abbate's account of his friend Panvini's explanation of the phenomenon.—"*Egli ripeteva lo sviluppo del gas acido carbonico dalla continua decomposizione dell' acqua in contatto coi sulfuri che ad evidenza esistono nelle viscere delle prossime colline. L' acido solforico (olio di vitriuolo), che risulta dalla detta decomposizione, passando al contatto delle pietre calcari, per la sua maggiore affinità colla calce, ne fa scappare l' acido carbonico. Questo restando libero si unisce col calorico che se ne sviluppa, e passando allo stato di gas, si manifesta in questa grotta, e produce così terribili effetti.*"²

To me it appears that the only difference between the Grotta del Cane and the Poisoned Valley is, that in Italy carbonic acid gas issues from a small cave, and in Java it issues from a crater at the top of a hill. Both localities are closely associated with volcanic action, and the noxious gas produces similar effects in both places. It remains to be shown whether or not the laboratory of Nature in Java supplies the constituents for a similar chemical action to that going on near Naples, as explained by the Abbate Romanelli.

¹ Pliny lib. 2, cap. 93.

² *Viaggio a Pesto, &c.*, dell' Abbate Domenico Romanelli, parte seconda, p. 100.